NASA Facts

National Aeronautics and
Space Administration

Marshall Space Flight Center
Huntsville, Alabama 35812

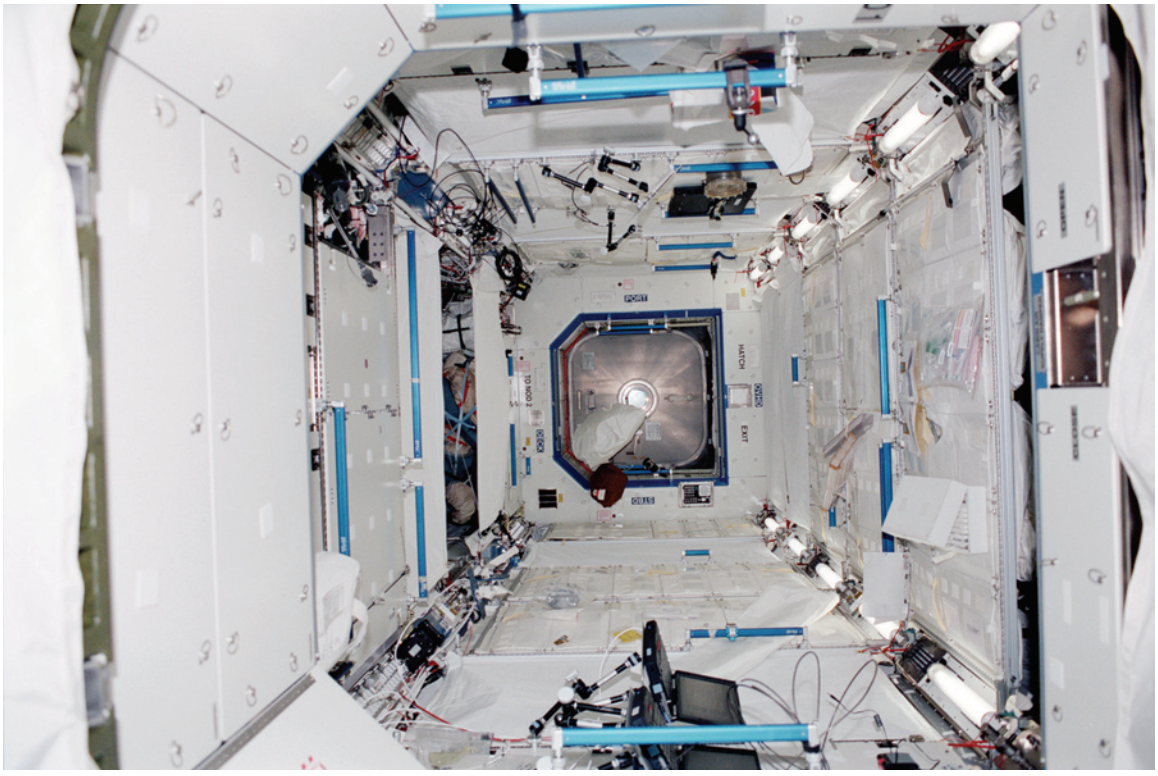
EXPRESS Racks 1 and 2

Missions: Expedition 2, ISS Mission 6A, STS-101 Space Shuttle Flight
Facility Location on ISS: Destiny
Project Manager: Annette Sledd, NASA's Marshall Space Flight Center, Huntsville, Ala.

Overview

The EXPRESS Rack is a standardized payload rack system that transports, stores and supports experiments aboard the International Space Station. EXPRESS stands for EXpedite the PRocessing of Experiments to the Space Station, reflecting the fact this system was developed specifically to maximize the Station's research capabilities.

The EXPRESS Rack system supports science payloads in several disciplines, including biology, chemistry, physics, ecology and medicine. With the EXPRESS Rack, getting experiments to space has never been easier or more affordable. NASA fuels discoveries that make the world smarter, healthier and safer.



This image shows an overall interior view of the U.S. Laboratory, Destiny. It has a capacity of 24 rack locations.

Facility Operations

With its standardized hardware interfaces and streamlined approach, the EXPRESS Rack enables quick, simple integration of multiple payloads aboard the International Space Station.

The system is comprised of elements that remain on the International Space Station, as well as elements that travel back and forth between the Space Station and Earth via the Space Shuttle. EXPRESS Racks stay on orbit continually, while experiments are exchanged in and out of the EXPRESS Racks as needed—remaining on the Space Station for three months to several years, depending on the experiment's time requirements.

The first two EXPRESS Racks were installed in the International Space Station during Expedition 2 on the STS-100 Space Shuttle Mission, ISS Mission 6A, in April 2001. Later Shuttle flights will handle the exchange of experiments or payload hardware and will also bring additional EXPRESS Racks to the Station.

Each EXPRESS Rack is housed in an International Standard Payload Rack (ISPR)—a refrigerator-size container that acts as the EXPRESS Racks' exterior shell. Each rack can be divided into segments, whether as large as half the entire rack or as small as a breadbox. The first two EXPRESS Racks have eight middeck locker locations and two drawer locations each.

Payloads within EXPRESS Racks can operate independently of each other—allowing for differences in temperature, power levels and schedules. EXPRESS Rack No. 2 is equipped with the Active Rack Isolation System (ARIS)—a system that acts as a shock absorber for delicate science experiments that could be damaged by vibrational disturbances.

Experiments contained within EXPRESS Racks may be controlled by the Space Station crew or remotely from the ground by the Payload Rack Officer on-duty at the Payload Operations Center at NASA's Marshall Space Flight Center in Huntsville, Ala. Seven days a week, 24 hours a day, a rack officer is on-hand to oversee rack maintenance and support experiments. Linked by computer to all payload racks aboard the Station, the officer routinely checks rack integrity, temperature control and the proper working conditions of Station experiments.

The EXPRESS Rack system was developed by NASA's Marshall Center and built by the Boeing Co. in Huntsville. Eight EXPRESS Racks are being built for use on the International Space Station.

Flight History/Background

The EXPRESS Rack was successfully tested during the Space Shuttle STS-94 mission in 1997. A primary focus of mission STS-94 was to evaluate facilities associated with the Microgravity Science Laboratory-1 payload. The mission served to bridge the gap between the relatively short-duration work done on Shuttle Spacelab flights and the long-duration research to be performed on the International Space Station.

Two EXPRESS Rack experiments on the STS-94 mission were activated 14 hours into the flight and ran until the 15th day of the mission. As a result of these experiments, NASA determined the EXPRESS Rack system is able to successfully support subrack payload operations.

Benefits

The International Space Station provides an orbital laboratory for conducting science experiments with minimal interference from the force of gravity. This research has the potential to impact the lives of people on Earth.

By housing, supporting and transporting these experiments, the EXPRESS Rack could play a key role in the development of better medicines, more powerful computer chips or lighter metals.

Similarly, by reducing the time, complexity and expense historically associated with orbital research, the EXPRESS Rack system will help universities and industry achieve these advances more quickly and for less money.

More information on the ARIS system and the International Space Station can be found at:
http://www.nasa.gov

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